USN | | | | | | | | | |

15CS63

Sixth Semester B.E. Degree Examination, Dec.2018/Jan.2019
System Software and Compiler Design

Time: 3 hrs.   Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain in detail SIC/XE machine architecture. (08 Marks)
   b. Write an SIC/XE program to calculate DELTA = ALPHA + BETA * GAMMA – 10 (08 Marks)

OR

2 a. Write an algorithm for Pass – 1 of an assembler. (08 Marks)
   b. Generate the object code for the following SIC/XE source program.

SUM	START	0
FIRST	CLEAR	X
	LDA	#0
	+LDB	#TOTAL
	BASE	TOTAL
LOOP	ADD	TABLE, X
	TIX	COUNT
	JLT	LOOP
	STA	TOTAL
COUNT	RESW	1
TABLE	RESW	2000
TOTAL	RESW	1
	END	FIRST

Mnemonic	ADD	JLT	LDA	LDB	LDX	RSUB	STA	TIX	JSUB	J	LDT	CLEAR
opcode	18	38	00	68	04	4C	0C	2C	08	3C	74	B4

(08 Marks)

Module-2

3 a. Write PASS-1 and PASS-2 algorithm for a linking loader. (08 Marks)
   b. Explain dynamic linking, automatic library search, loader design options with suitable examples. (08 Marks)

OR

4 a. Write the SIC/XE program for a bootstrap loader with suitable comments. Explain in brief the algorithm of a bootstrap loader. (08 Marks)
   b. Explain in brief (i) MS-DOS linker and (ii) CRAY MPP linker. (08 Marks)

Module-3

5 a. List and explain the various phases of a compiler and show the output of each phase for the expression a := b + c * 25 (08 Marks)
   b. Construct transition diagram for recognizing relational operators. Sketch the program segment to implement it, showing the first state and one in final state. (08 Marks)

OR

6 a. Explain input buffering strategy used in lexical analysis phase. **(06 Marks)**

   b. Write the regular definition for unsigned number, also write the transition diagram.
       (06 Marks)

   c. Construct the transition diagrams for a set of keywords like begin, end, if then and else and identifiers and constants along with a minimum set of relational operators. **(04 Marks)**

Module-4

7 a. What is shift reduce parser? Explain the conflicts that may occur during shift reduce parsing.
       (04 Marks)

   b. Construct LALR parsing tables for the grammar shown below using LR(1) items.

   $S' \rightarrow S$

   $S \rightarrow Cc$

   $C \rightarrow cC \mid d$ **(08 Marks)**

   c. How left recursion can be eliminated from grammars? Write down the simple arithmetic expression grammar and rewrite the grammar after removing left recursion. **(04 Marks)**

OR

8 a. What is left factoring? Rewrite the following grammar after "left factored"

   $S \rightarrow iEts \mid iEtSeS \mid a$

   $E \rightarrow b$ **(04 Marks)**

   b. Write a note on the parser generator – yacc. **(04 Marks)**

   c. Construct canonical LR(1) items for the augmented grammar

   $S' \rightarrow S$;

   $S \rightarrow Cc$

   $C \rightarrow cC \mid d$ **(08 Marks)**

Module-5

9 a. Define synthesized and inherited attributes with examples. **(04 Marks)**

   b. Briefly explain the main issues in code generation. **(08 Marks)**

   c. Explain in brief dead code elimination. **(04 Marks)**

OR

10 a. Construct DAG for the expression

   $a + b * (a + b) + c + d$ **(04 Marks)**

   b. Give SDD of a simple calculator. **(04 Marks)**

   c. Write a note on common sub expression. **(04 Marks)**

   d. What are the steps involved in optimization of basic blocks. Explain any 2 steps in brief.
       (04 Marks)

* * * * *